

**REMARKS**

The Final Office Action mailed January 2, 2004, has been received and reviewed. Claims 1 through 9, 11 through 32, and 34 through 62 are currently pending in the application. Claims 1 through 9, 11 through 32, 34 through 50, and 52 through 62 stand rejected. Although the Office Action Summary includes claim 51 as a rejected claim, the body of the Office Action does not set forth a basis for such rejection. Applicants respectfully request a basis for rejection of claim 51. Applicants propose to amend claim 1 and respectfully request reconsideration of the application as proposed to be amended herein.

Where possible, Applicants have followed the numbering present in the Office Action regarding reasons for rejection.

Response to Examiner's arguments

Before addressing individual claims, Applicants wish to address the two primary issues with which the Examiner appears to see obviousness. These issues are addressed separately by the Examiner and are applicable to all of the independent claims. Therefore, a separate detailed analysis of these issues will clarify analysis of the individual claims and reduce repetition of arguments in the individual claims. Applicants have labeled these two issues, "sensor issues" and "power source issues."

Sensor issues

Once again, Applicants reiterate their argument that it would not be obvious to expand sensors to "measure at least one moisture parameter of said at least one soil medium," as specified in independent claims 30. The Schuermann reference only identifies temperature and pressure as possible parameters. Particularly, there would be no reasonable expectation of success to expand the teachings of Schuermann to the measurement of moisture parameters in a soil medium. It would not be obvious to a person of ordinary skill in the art, nor would one of ordinary skill in the art be motivated to extrapolate from temperature and pressure measurements

in the relatively benign operational environment of Schuermann to moisture measurement in a potentially caustic environment such as a moist soil medium.

Additionally, the Office Action does not directly address Applicants' argument that the combination of references attempted by the Examiner is not expressly or impliedly suggested in, or motivated by, the Schuermann and Hirsch references. Rather, the Examiner relies on the statement "as long as the prior arts suggest the claimed limitations and the date of said prior arts are valid for the rejection purpose, then it would be proper for one skilled in the art to **combine** said prior arts if there is **motivation**." Applicants respectfully suggest that this does not fully describe the obviousness test nor does it describe the Examiner's burden to prove *prima facie* obviousness. There are many elements to proving a *prima facie* case of obviousness, as suggested by the following cases:

In establishing a *prima facie* case of obviousness, the initial burden is placed on the examiner. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention **or the examiner must present a convincing line of reasoning** as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). See also MPEP § 706.02(j) and § 2142. (emphasis added)

Further, "when the **motivation** to combine the teachings of the references is not immediately apparent, **it is the duty of the Examiner to explain why the combination of the teachings is proper**. *Ex parte Skinner*, 2 USPQ2d 1788 (Bd. Pat. App. & Inter. 1986). M.P.E.P. §2142. (emphasis added)

Further, the evidentiary **showing of a motivation or suggestion** to combine prior art references "**must be clear and particular**." *In re Dembiczak*, 175 F.3d 994, 999; 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). (emphasis added)

Also, "[a] statement that modification of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the time the claimed invention was made because the reference relied upon teach that all aspects of the claimed invention were individually known in the art is **not sufficient** to establish a *prima facie* case of obviousness without some **objective reason to combine** the teachings of the references." *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). (emphasis added)

Finally, “[t]his factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to use that which the inventor taught against its teacher.” In re Lee, 277 F.3d 1338, 1342, 61 USPQ2d 1430 (Fed. Cir. 2002).

Because the Office Action is relying on motivation, the Examiner must, **present a convincing line of reasoning and explain why the combination of the teachings is proper**. Additionally, the presentation and reasoning must be **clear and particular**. Applicants respectfully submit that the mere statement that if motivation is present the combination is proper, is neither clear and particular, nor a **convincing line of reasoning**. Additionally, as suggested in Ex parte Skinner, it is the duty of the Examiner to explain **why** the motivation to combine is proper, not just that it is proper to combine **if** motivation is present.

Since there are no explicit or implicit suggestions to make the combination in the references, the Examiner has the burden to show motivation of a person of ordinary skill in the art to combine these particular references. Applicants respectfully submit that the only reason they are combined is because the Examiner has impermissibly used hindsight occasioned by Applicants’ teaching to hunt through the prior art for the claimed elements and combine them as claimed.

Otherwise, without an **objective reason** as to why a person of ordinary skill in the art would be motivated to combine the limitations from different references, the Examiner may likely claim motivation for any invention ever made, since almost all inventions are combinations of known elements.

#### Power source issues

The Examiner has ignored Applicants’ argument that the probe in the Hirsch reference requires power to be present prior to an excitation signal from a reader. In contrast, the present invention, using inductive coupling, powers up as a result of an excitation signal from a reader.

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If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Hirsch implies that sensor station power must be active at the time commands are received and moisture content is measured (col. 4, lines 8-12). In the present invention, the excitation signal, which may contain commands, provides the power by way of inductive coupling during transmission of the excitation signal. Hirsch would not be able to recognize the commands generated unless power, through the solar cell or battery, was present prior to the time of the excitation/command signal. Without power prior to the excitation signal the Hirsch reference will not respond. Modification of the operating principles of the design of the reference to enable the probe to generate its own power as a result of the excitation signal is a drastic change that would not be obvious to a person of ordinary skill in the art. Additionally, it would not be obvious to a person of ordinary skill in the art to significantly modify probe operation so as to begin operation only after receipt of an excitation signal.

It seems to Applicants that absent a suggestion or motivation to combine the references, only impermissible hindsight, arrived at by a search to find all the claimed elements followed by a combination, would arrive at the combination. In other words, the combination only resulted because of Applicants' teachings to combine them.

Additionally, the Office Action, in the section dealing with rejection of claims, 1, 11, 14, 16, and 30, too easily glosses over the **transitory electromagnetic energy** limitation. The Office Action states, "[A]pparently, using solar source and inductive powering to provide power for a device has been conventionally done. Furthermore, inductive powering and using solar as a source of power both help energy conservation." Beyond the start up issue above, a closer reading of this limitation would show, according to claim 30 "an excitation signal transmitted to the probe by the reader to generate **transitory electromagnetic energy sufficient to provide power for the probe, to measure** the moisture content of the soil and **to transmit** a data signal to the reader." The key is that the transitory energy generated is sufficient to measure the soil moisture content and transmit the data. This is emphasized by the **transitory** nature of the power generation. In other words, the focus of this limitation in the present invention is that **sufficient**

power is **generated and used** on demand from the reader. The energy is not generated and stored beforehand for when a reader may request data, as in the Hirsch reference. The mode of operation of the present invention is a significant departure from the mode of operation of the reference. This significant departure is not taught or suggested in either reference.

As an example, consider a cellular phone using a rechargeable battery power source. A cellular phone also receives a data signal modulated on a carrier wave. Using the Office Action's line of reasoning, if we substitute a battery for a solar source, we get an argument that using battery power and inductive powering to provide power for a device has been conventionally done. Furthermore, inductive powering and using a battery as a source of power both help conserve energy. Therefore, it is obvious to a person of ordinary skill in the art to alternatively provide the inductive power method disclosed by Schuermann to the cellular phone. It should be clear, however, that this conclusion is anything but obvious. Even after considering the differences in complexity, it is not obvious from the references as applied or the general state of the art that inductive power can supply sufficient power for the probe as disclosed in Hirsch.

### **35 U.S.C. § 103(a) Obviousness Rejections**

#### 4. Obviousness Rejection Based on U.S. Patent No. 4,396,149 to Hirsch in View of U.S. Patent No. 5,053,774 to Schuermann et al.

Claims 1 through 4, 6 through 8, 11 through 18, 24 through 26, 30 through 32, 35, 41 through 43, 46, and 60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirsch (U.S. Patent No. 4,396,149) in view of Schuermann et al. (U.S. Patent No. 5,053,774).

Applicants respectfully traverse this rejection, as hereinafter set forth.

Regarding independent claims 1, 30, and 42, Applicants submit that these claims are not obvious due to the arguments set forth above for both the sensor issues and the power source issues. Each of these claims contain limitations directed at both the sensor issues and the power source issues. For clarity, and to emphasize the power source issues, Applicants' propose to modify a limitation in independent claim 1, to read more like the similar limitation in claims 30 and 42 indicating that the power generated by the probe is sufficient to measure data and transmit

data. This limitation in claim 1 is modified as follows, "generate transitory electromagnetic energy sufficient to provide power for said at least one probe to measure . . .; and transmit . . ."

Because independent claims 1, 30, and 42 each contain the aforementioned non-obvious limitations related to the sensor issues and the power source issues, independent claims 1, 30, and 42 are now allowable. Therefore, Applicants respectfully request that the rejection of these claims be withdrawn.

Regarding claims 2-4, and 6, these claims are allowable because they are dependent on now allowable independent claim 1. Therefore, Applicants respectfully request that the rejection of claims 2-4 and 6 be withdrawn.

Regarding claim 7, the Office Action states that "it would have been obvious to one of ordinary skill in the art would recognize that using different frequencies for said data signal and said excitation signal would avoid interference for the reader because the reader might be sending out other excitation signals while the data signal is arriving." Once again, the Examiner has not provided a **clear and particular** argument or a **convincing line of reasoning** why a person of ordinary skill in the art would make this modification.

Additionally, the Examiner has ignored Applicants' argument that Schuermann actually teaches away from using different frequencies. The argument is reiterated for consideration here. As stated in col. 7, lines 7-25, Schuermann teaches that,

"the coil 38 acts as transmitting coil which transmits the RF carrier wave as RF interrogation pulse for a duration defined by the duration of the signal . . . **After expiry of this duration defined by the microprocessor 18 operation of the RF generator 20 ends (instant t3). To ensure that the oscillation in the resonant circuit formed by the coil 38 and the capacitor 40 dies away aperiodically as quickly as possible the switch 42 is briefly opened . . . After again closing switch 42 the switch 46 is opened (instant t4) and as a result the resonant circuit comprising the coil 38 and the capacitor 40 is switched over to a series resonant circuit and is ready to receive a reply from the responder unit 12.**"

It is clear that Schuermann teaches using a single resonant circuit for both transmission and reception in the interrogation unit. Additionally, Schuermann provides circuitry to ensure

that transmission oscillations die out so as not to interfere with detection of a reply from the responder unit. Using a single resonant circuit and at different temporal points for transmission and reception clearly teaches away from "said data signal having a frequency substantially different than that of said excitation signal."

For these reasons, and because claim 7 is dependent on now allowable claim 1, claim 7 is allowable and Applicants respectfully request that the rejection of claim 31 be withdrawn.

Regarding claims 8 and 11-17, these claims are allowable because they are dependent on now allowable independent claim 1. Therefore, Applicants respectfully request that the rejection of claims 8 and 11-17 be withdrawn.

Regarding claim 18, the Office Action states, "Schuermann et al. also teaches a modulated carrier signal for the excitation signal and the data signal. Apparently, said excitation signal has to contain data regarding the identification of the transponder." Applicants respectfully submit that in the present invention the excitation signal does not have to include a data signal. In fact, many of the embodiments described in the present invention do not contain a data signal as part of the excitation signal. In any event, claim 18 is dependent on now allowable claim 1, and is therefore allowable. Therefore, Applicants respectfully request that the rejection of claim 18 be withdrawn.

Regarding claims 24-26, these claims are dependent on now allowable independent claim 20, as explained below. Therefore, Applicants respectfully request that the rejection of claims 24-26 be withdrawn.

Regarding claim 31, claim 31 is allowable for the same reasons stated above for claim 7 and because claim 31 is dependent on now allowable claim 30. Therefore, Applicants respectfully request that the rejection of claim 31 be withdrawn.

Regarding claims 32 and 35, the Office Action has ignored Applicants' argument from

the previous Office Action. In the previous Office Action, Applicants stated that claim 32 was amended such that the resonant frequency of the electronic circuit is dependent on the moisture sensing capacitor. This is clearly different from Schuermann, where the resonant frequency is at a specific value determined by fixed value elements. In other words, in the claim 32 limitation, **the resonant frequency is dependent upon the parameter being measured**. Schuermann and Hirsch do not teach or suggest a resonant frequency that is dependent on the parameter being measured. Schuermann only teaches a resonant frequency, upon which, data from the measured parameter may be frequency modulated. In addition, claims 32 and 35 are dependent on now allowable independent claim 30 and is therefore allowable. Therefore, Applicants respectfully request that the rejection of claims 32 and 35 be withdrawn.

Regarding claim 41, this claim is allowable because it is dependent on now allowable independent claim 30. Therefore, Applicants respectfully request that the rejection of claim 41 be withdrawn.

Regarding claims 43 and 46, these claims are allowable because they are dependent on now allowable independent claim 42. Therefore, Applicants respectfully request that the rejection of claims 43 and 46 be withdrawn.

Regarding claim 60, this claim is allowable as dependent on now allowable independent claim 53, as explained below. As a result, Applicants respectfully request that the rejection of claim 60 be withdrawn.

5. Obviousness Rejection Based on U.S. Patent No. 4,396,149 to Hirsch in View of U.S. Patent No. 5,053,774 to Schuermann et al. and Further in View of U.S. Patent No. 4,903,031 to Yamada

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirsch (U.S. Patent No. 4,396,149) in view of Schuermann et al. (U.S. Patent No. 5,053,774) and further in view of Yamada (U.S. Patent No. 4,903,031). Applicants respectfully traverse this rejection, as hereinafter set forth.



The Office Action states that Yamada “teaches a transmission system, which includes circuitry for blocking certain receivers from receiving transmitted signals.” However, the Examiner has ignored Applicants’ argument regarding the teachings of Yamada. What Yamada teaches is different, from what is claimed in claims 9 as “said reader comprising blocking circuitry, said blocking circuitry substantially preventing said at least one excitation **signal transmitted by said reader from being received by said reader.**” In other words, the receiver is blocking receipt of the signal transmitted by itself.

In Yamada, “the switch 7 is arranged between the demodulator 6, and a television (TV) receiver 8 and serves to selectively disconnect the video signal and the audio signal.” Yamada appears to be a one-way system where the transmission of a signal between a demodulator and a TV may be selectively disconnected or blocked. Applicants can find nothing in Yamada referring to blocking the transmitted signal from being received back at the receiver. In other words, Yamada prevents a signal from being transmitted, whereas the present invention prevents a signal, albeit the same signal that was transmitted, from being received. Therefore, this element is not taught or suggested by the combination of Schuermann, in view of Hirsch and in further view of Yamada.

Additionally, claim 9 is dependent on the now allowable amended claim 1. For these reasons, claim 9 is now allowable and Applicants respectfully request that the rejection of claim 9 be withdrawn.

6. Obviousness Rejection Based on U.S. Patent No. 5,053,774 to Schuermann et al. in View of U.S. Patent No. 4,396,149 to Hirsch and Further in View of U.S. Patent No. 5,337,957 to Olson

Claims 19 through 23, 27 through 29, 53 through 59, 61, and 62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuermann et al. (U.S. Patent No. 5,053,774) in view of Hirsch (U.S. Patent No. 4,396,149) and further in view of Olson (U.S. Patent No. 5,337,957). Applicants respectfully traverse this rejection, as hereinafter set forth.

Regarding claim 19, this claim is allowable because it is dependent on now allowable

independent claim 1. Therefore, Applicants respectfully request that the rejection of claim 19 be withdrawn.

Regarding independent claim 20, Applicants submit that this claim is not obvious due to the arguments set forth above regarding both the sensor issues and the power source issues. As a result, independent claim 20 is now allowable and Applicants respectfully request that the rejection of this claim be withdrawn.

Regarding claims 21-23, the Office Action states, "Schuermann et al. also teaches a modulated carrier signal for the excitation signal and the data signal. Apparently, said excitation signal has to contain data regarding the identification of the transponder." Applicants respectfully submit that in the present invention the excitation signal does not have to include a data signal. In fact, many of the embodiments described in the present invention do not contain a data signal as part of the excitation signal. In any event, claims 21-23 are dependent on now allowable independent claim 20, and are therefore allowable. As a result, Applicants respectfully request that the rejection of claims 21-23 be withdrawn.

Regarding claims 27-29, these claims are allowable because they are dependent on now allowable independent claim 20. Therefore, Applicants respectfully request that the rejection of claims 27-29 be withdrawn.

Regarding independent claim 53, Applicants submit that this claim is not obvious due to the arguments set forth above for both the sensor issues and the power source issues. As a result, independent claim 53 is now allowable and Applicants respectfully request that the rejection of this claim be withdrawn.

Regarding claims 54-59 and 61, these claims are allowable because they are dependent on now allowable independent claim 53. Therefore, Applicants respectfully request that the rejection of claims 54-59 and 61 be withdrawn.

Regarding independent claim 62, Applicants submit that this claim is not obvious due to the arguments set forth above regarding both the sensor issues and the power source issues. As a result, independent claim 62 is now allowable and Applicants respectfully request that the rejection of this claim be withdrawn.

7. Obviousness Rejection Based on U.S. Patent No. 4,396,149 to Hirsch in View of U.S. Patent No. 5,053,774 to Schuermann et al. and Further in View of U.S. Patent No. 4,683,904 to Iltis

Claims 5, 34, 36 through 40, 44, and 62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirsch (U.S. Patent No. 4,396,149) in view of Schuermann et al. (U.S. Patent No. 5,053,774) and further in view of Iltis (U.S. Patent No. 4,683,904). Applicants respectfully traverse this rejection, as hereinafter set forth.

Regarding claim 5, this claim is allowable because it is dependent on now allowable independent claim 1. Therefore, Applicants respectfully request that the rejection of claim 5 be withdrawn.

Regarding claim 34, the Examiner has not addressed Applicants' argument presented in the previous amendment. Iltis is quite different in how it generates an oscillating signal wherein the oscillating frequency is dependent on the moisture sensing capacitor.

In Iltis the "relaxation oscillator 18 comprises unijunction transistor 12, the basic or dry soil frequency being governed by capacitor 19 coupled between emitter 20 and ground, while base 23 is connected to ground through resistor 23. The capacitance which determines the operating frequency of oscillator 18 at any particular time is a combination of plates 12 and 14 buried in the soil, and capacitor 19." (col. 3, line 65 to col. 4, line 4)

The Iltis oscillator, therefore, uses active elements in combination with the passive components of capacitance and resistance to produce the oscillating frequency. On the other hand, the present invention generates a resonant frequency using *only* the passive elements of the moisture sensing capacitor and the inductive loop. This alone is a difference that is not obvious.

The Iltis reference must use active elements to generate an oscillation. However, the present invention may generate an oscillation due to the presence of an excitation signal.

Additionally, active elements tend to require more power than passive elements. There is nothing in the prior art of record to suggest that the Iltis reference, which requires “two lithium batteries to provide approximately 7 volts” (col. 4, lines 45-47), could be modified to meet the amount of transitory power generated by the excitation signal in the present invention. As argued above in the power source issues section and the sensor issues section, absent a suggestion to combine the teachings in the prior art, if the Examiner argues a motivation to combine the references, the Examiner must, **present a convincing line of reasoning and explain why the combination of the teachings is proper**. Additionally, the presentation and reasoning must be **clear and particular**. The Examiner has not presented this reasoning.

In addition, claim 34 is dependent upon now allowable amended claim 30 and is therefore allowable independent of the above argument for non-obviousness. For these reasons, Applicants respectfully request that the rejection of claim 34 be withdrawn.

Regarding claims 36-40, these claims are allowable because they are dependent on now allowable independent claim 30. Therefore, Applicants respectfully request that the rejection of claims 36-40 be withdrawn.

Regarding claim 44, this claim is allowable because it is dependent on now allowable independent claim 42. Therefore, Applicants respectfully request that the rejection of claim 44 be withdrawn.

Regarding independent claim 62, Applicants submit that this claim is not obvious due to the arguments set forth above regarding both the sensor issues and the power source issues. As a result, independent claim 62 is now allowable and Applicants respectfully request that the rejection of this claim be withdrawn.

8. Obviousness Rejection Based on U.S. Patent No. 4,396,149 to Hirsch in View of U.S. Patent No. 5,053,774 to Schuermann et al. and Further in View of U.S. Patent No. 5,927,603 to McNabb

Claims 45, 47, 49, 50, and 52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirsch (U.S. Patent No. 4,396,149) in view of Schuermann et al. (U.S. Patent No. 5,053,774) and further in view of McNabb (U.S. Patent No. 5,927,603). Applicants respectfully traverse this rejection, as hereinafter set forth.

Regarding claim 45, this claim is allowable because it is dependent on now allowable independent claim 42. Therefore, Applicants respectfully request that the rejection of claim 45 be withdrawn.

Regarding independent claim 47, Applicants submit that this claim is not obvious due to the arguments set forth above for both the sensor issues and the power source issues. As a result, independent claim 47 is now allowable and Applicants respectfully request that the rejection of this claim be withdrawn.

Regarding claims 49, 50 and 52, these claims are allowable because they are dependent on now allowable independent claim 47. Therefore, Applicants respectfully request that the rejection of claims 49, 50, and 52 be withdrawn.

9. Obviousness Rejection Based on U.S. Patent No. 4,396,149 to Hirsch in View of U.S. Patent No. 5,053,774 to Schuermann et al. and Further in View of U.S. Patent No. 5,927,603 to McNabb and U.S. Patent No. 4,662,563 to Wolfe, Jr.

Claim 48 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirsch (U.S. Patent No. 4,396,149) in view of Schuermann et al. (U.S. Patent No. 5,053,774) and further in view of McNabb (U.S. Patent No. 5,927,603) and Wolfe, Jr. (U.S. Patent No. 4,662,563). Applicants respectfully traverse this rejection, as hereinafter set forth.

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Claim 48 claim is allowable because it is dependent on now allowable independent claim 47. Therefore, Applicants respectfully request that the rejection of claim 48 be withdrawn.

### ENTRY OF AMENDMENTS

The proposed amendments to claim 1 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search, as substantially similar limitations are already present in independent claims 30 and 42. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

### CONCLUSION

Claims 1-9, 10-32, and 34-62 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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